

## Who is experiencing differential impact from HIV/AIDS? Technical Notes and Data Tables

### Technical Notes:

#### Explanation of Age Adjusted Rates

A “rate” of a disease per 100,000 population is a more precise way to compare groups that have substantially different population sizes rather than relying on the raw number of cases. For example, the number of people living with HIV/AIDS as of July 1, 2004 who are Hispanic is 3,598, whereas the number of people living with HIV/AIDS who are white is 6,895. Although the *number* of people living with HIV/AIDS who are Hispanic in Massachusetts is smaller than the number of people living with HIV/AIDS who are white, we also need to consider that there are fewer people of Hispanic heritage than white individuals living in Massachusetts. Hispanic individuals represent 6% of the Massachusetts population compared to white individuals who represent 82% of the population. So if HIV/AIDS had the same impact on the Hispanic population of the state as on the white, then there should be almost twelve times as many cases in white individuals, but there are only almost two times as many. By calculating a rate that takes the differences in the population size into consideration, we learn that the number of people living with HIV/AIDS for every 100,000 Hispanic individuals in Massachusetts is much higher than the rate for every 100,000 white individuals. This is called a “crude rate” and is calculated by dividing the number of people living with HIV/AIDS by the entire population (everyone or the sub-population involved) and multiplying by 100,000. (See example 1.A below). The source for the population sizes of mutually exclusive racial/ethnic categories used in these calculations is the Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE) file. This file was derived from the 2000 US Census by allocating persons who indicated “some other race” or multiple races to the conventional DPH race categories: “White”, “Black or African American”, “Asian” and “Native American.”

#### Example 1.A: Calculation of Crude HIV/AIDS Prevalence Rate for Whites, Massachusetts (129 per 100,000)

Crude HIV/AIDS prevalence  
rate for white individuals       $= (\text{number of white individuals living with HIV/AIDS} \div \text{population size of white individuals}) \times 100,000$   
    $= (6,895 / 5,326,585) \times 100,000$   
    $= (0.00129445) \times 100,000$   
    $= 129.4$

An average annual rate of HIV diagnosis is another crude rate which takes differences in population size into consideration. It is calculated similarly to the HIV/AIDS prevalence rate. To adjust for fluctuations in the annual rate of HIV diagnosis, the

average rate of diagnosis is calculated over a three-year period by adding the total number of HIV diagnoses in each of the three years and dividing by three. The average annual rate of HIV diagnosis is then calculated by dividing the average number of people who were diagnosed with HIV infection during the three years by the entire population (everyone or the sub-population involved) and multiplying by 100,000. (See example 1.B below). The Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE) file is the source of population sizes for these calculations.

**Example 1.B: Calculation of Crude Average Annual HIV Diagnosis Rate for Whites, Massachusetts, 2001-2003 (7 per 100,000)**

$$\begin{aligned} \text{Crude average annual HIV} & \\ \text{diagnosis rate for white} & \\ \text{individuals, 2001-2003} & = ((\text{number of white individuals diagnosed with HIV} \\ & \text{infection in 2001} + \text{number of white individuals diagnosed} \\ & \text{with HIV infection in 2002} + \text{number of white individuals} \\ & \text{diagnosed with HIV infection in 2003}) \div 3) \div (\text{population} \\ & \text{size of white individuals}) \times 100,000 \\ & = (((393 + 388 + 304) \div 3)) \div 5,326,585) \times 100,000 \\ & = ((1,085 \div 3) \div 5,326,585) \times 100,000 \\ & = (361.67 \div 5,326,585) \times 100,000 \\ & = 0.0000679 \times 100,000 \\ & = \mathbf{6.8} \end{aligned}$$

Sometimes, in addition to the population size being different, the age composition of the populations is different. In Massachusetts, black and Hispanic populations are younger than white. The median age of black people (29.7 years) and Hispanic people (24.5 years) is younger than that of white people (38.8 years). Therefore, it is necessary to “age-adjust” the HIV/AIDS prevalence rate and average annual rate of HIV diagnosis to get a true comparison of the impact of the disease across racial/ethnic groups without an effect from the differences in age composition. Age-adjustment of rates minimizes the distortion created by differences in age composition.

Age-adjusted rates are calculated by weighting the age-specific rates for a given population by the age distribution of a standard population. The age-specific rates are calculated for eleven age groups ranging from less than one year old to 85 years or above and are weighted by the 2000 US standard population. The weighted age-specific rates are then added to produce the adjusted rate for all ages combined. (See example 1.B below).

**Example 1.C: Calculation of Age-adjusted HIV/AIDS Prevalence Rate for White Individuals, Massachusetts (123 per 100,000)**

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>Age group (in years)</i>	<i># of prevalent HIV/AIDS cases</i>	<i>Population (2000)</i>	<i>2000 US standard population weight</i>	<i>Age-adjusted rate ((B÷CxD)×100,000))</i>
<1	0	61,381	0.013818	0.0
1-4	0	245,562	0.055317	0.0
5-14	11	675,388	0.145565	0.2
15-24	77	634,387	0.138646	1.7
25-34	668	734,417	0.135573	12.3
35-44	3,061	902,498	0.162613	55.2
45-54	2,369	771,970	0.134834	41.4
55-64	605	491,985	0.087247	10.7
65-74	96	396,458	0.066037	1.6
75-84	6	300,442	0.044842	0.1
85+ years	2	112,097	0.015508	0.0
<b>Total</b>				<b>123.2</b>

To see the effect of age-distribution on prevalence and diagnosis rates see Tables 5.1 and 5.3 below for a comparison of crude and age-adjusted rates by race/ethnicity.

**Data Tables:**

<b>Table 5.1 Crude and Age-Adjusted HIV/AIDS Prevalence per 100,000 Population by Race/Ethnicity and Gender: MA</b>		
<i>Data as of July 1, 2004</i>		
<b>State Total:</b>	<b>Crude Rate per 100,000</b>	<b>Age-Adjusted Rate per 100,000</b>
White (non-Hispanic)	129	123
Black (non-Hispanic)	1,175	1,256
Hispanic	839	1,062
Asian/Pacific Islander	69	70
American Indian/Alaskan Native	174	163
<b>MA Total Rate</b>	<b>232</b>	<b>226</b>
<b>Males:</b>	<b>Crude Rate per 100,000</b>	<b>Age-Adjusted Rate per 100,000</b>
White (non-Hispanic) Males	218	204
Black (non-Hispanic) Males	1,449	1,616
Hispanic Males	1,154	1,547
Asian/Pacific Islander Males	109	113
American Indian/Alaskan Native Males	175	167
<b>MA Total Rate Among Males</b>	<b>345</b>	<b>333</b>
<b>Females:</b>	<b>Crude Rate per 100,000</b>	<b>Age-Adjusted Rate per 100,000</b>
White (non-Hispanic) Females	48	47
Black (non-Hispanic) Females	921	941
Hispanic Females	532	630
Asian/Pacific Islander Females	30	30
American Indian/Alaskan Native Females	173	160
<b>MA Total Rate Among Females</b>	<b>127</b>	<b>125</b>
<small>1 The denominators for rate calculations are based on year 2000 population estimates from the MDPH Center for Health Information, Statistics, Research and Evaluation Data Source: MDPH HIV/AIDS Surveillance Program</small>		

**Table 5.2 Age-Adjusted HIV/AIDS Prevalence Rate per 100,000 Population<sup>1</sup> by Race/Ethnicity and Health Service Region (HSR): MA**  
*Data as of July 1, 2004*

	<b>Boston</b>	<b>Central</b>	<b>Metro West</b>	<b>North- east</b>	<b>South- East</b>	<b>Western</b>	<b>State Total</b>
White NH	524	78	71	92	116	72	<b>123</b>
Black NH	1,271	1,256	1,185	1,215	1,006	876	<b>1,256</b>
Hispanic	950	1,109	472	706	1,071	1,462	<b>1,062</b>
API	114	75	32	100	59	18	<b>70</b>
AI/AN	282	109	0	234	115	66	<b>163</b>
<b>Total</b>	<b>702</b>	<b>151</b>	<b>114</b>	<b>158</b>	<b>163</b>	<b>207</b>	<b>226</b>

<sup>1</sup> Population sizes for rate calculations are based on year 2000 population estimates from the MDPH Center for Health Information, Statistics, Research and Evaluation  
 NH = Non-Hispanic, API = Asian/Pacific Islander, AI/AN = American Indian/Alaska Native  
 Data Source: MDPH HIV/AIDS Surveillance Program

**Table 5.3 Crude and Age-Adjusted Rates of Diagnosis of HIV Infection per 100,000 Population by Race/Ethnicity and Gender: Average Annual Rate 2001 – 2003, MA**

*Data as of July 1, 2004*

State Total:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic)	7	7
Black (non-Hispanic)	88	90
Hispanic	49	56
Asian/Pacific Islander	8	8
American Indian/Alaskan Native	12	11
<b>MA Total Rate</b>	<b>14</b>	<b>14</b>
Males:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic) Males	12	11
Black (non-Hispanic) Males	99	104
Hispanic Males	67	80
Asian/Pacific Islander Males	12	11
American Indian/Alaskan Native Males	17	16
<b>MA Total Rate Among Males</b>	<b>20</b>	<b>20</b>
Females:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic) Females	2	2
Black (non-Hispanic) Females	78	78
Hispanic Females	31	34
Asian/Pacific Islander Females	4	4
American Indian/Alaskan Native Females	6	5
<b>MA Total Rate Among Females</b>	<b>8</b>	<b>8</b>
<p><sup>1</sup> The denominators for rate calculations are based on year 2000 population estimates from the MDPH Center for Health Information, Statistics, Research and Evaluation  Data Source: MDPH HIV/AIDS Surveillance Program</p>		

**Table 5.4 Age-Adjusted Rate of HIV Diagnosis per 100,000 Population<sup>1</sup> by Race/Ethnicity and Health Service Region (HSR): Average Annual Rate 2001-2003, MA**

*Data as of July 1, 2004*

	<b>Boston</b>	<b>Central</b>	<b>Metro West</b>	<b>North-east</b>	<b>South-East</b>	<b>Western</b>	<b>State Total</b>
White NH	27	4	3	5	7	4	7
Black NH	87	97	93	123	75	49	90
Hispanic	56	49	34	35	63	83	56
API	7	12	3	14	13	3	8
AI/AN	19	0	0	0	18	0	11
<b>Total</b>	<b>41</b>	<b>8</b>	<b>7</b>	<b>10</b>	<b>10</b>	<b>13</b>	<b>14</b>

<sup>1</sup> Population sizes for rate calculations are based on year 2000 population estimates from the MDPH Center for Health Information, Statistics, Research and Evaluation

NH = Non-Hispanic, API = Asian/Pacific Islander, AI/AN = American Indian/Alaska Native

Data Source: MDPH HIV/AIDS Surveillance Program